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EXAMINER
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CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 09/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/019,483

Applicant(s)

BENCZUR-UERMOESSY ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 7/9/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 32-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 32-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 09 July 2003 is: a) ☐ approved b) ☒ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Response to Amendment***

1. In response to the amendment received July 9, 2003:
  - a. Claims 32-58 are pending;
  - b. The proposed drawing correction has been received, however this correction does not overcome the drawing objection for the reasons set forth below;
  - c. The substitute specification has been received, however it does not overcome the specification objections for the reasons set forth below;
  - d. The claim objection has been overcome in light of Applicant's cancellation of claim 31;
  - e. The 112 first paragraph rejection stands;
  - f. The 112 second paragraph rejections have been overcome by the amendment and have been withdrawn;
  - g. New grounds of rejection have been made in light of an updated search.Consequently this action is non-final.

### ***Drawings***

2. As set forth in the previous office action, the drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the

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claims. Therefore, the tie rod must be shown or the feature(s) canceled from the claim(s). ***No new matter should be entered.***

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The proposed drawing change to Fig. 2 attached to the substitute specification has not been approved since it introduces new matter. There is no explicit disclosure for the tie rods as shown in Fig. 2. In addition, the substitute specification includes new matter to disclosure corresponding to the change to Fig. 2 providing tie rods 17. Thus while the Examiner has considered Applicant's attempt to overcome the drawing objection, the proposed change is held to present new matter by incorporating tie rods 17 into both Fig. 2 and the written disclosure without adequate original disclosure for such.

#### ***Response to Arguments***

4. Applicant's arguments filed July 9, 2003 have been fully considered but they are not persuasive.

Applicant argues that the drawing objection has been overcome by the proposed change to Fig. 2 in the substitute specification.

The Examiner is not persuaded for the reasons set forth in item 3 above, incorporated herein.

***Specification***

5. As set forth in the previous office action, the disclosure is objected to because of the following informalities:

a. The first paragraph of page 1 recites "Claim 1" and "Claim 27". Currently there are no claims 1 or 27 and if the application is allowed, claims 1 and 27 may not be drawn to the same subject matter of original claims 1 and 27. It is suggested that Applicant delete the "... in accordance with the preamble of claim ... preamble of Claim 27" in the first paragraph of page 1 to overcome this objection. This also applies to the third paragraph of page 3. Appropriate correction is required.

6. As set forth in the previous office action, the specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37

CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- a. The specification fails to recite the capacitance limitations of claims 34 and 35;
- b. The specification fails to recite the negative electrode arrangement of claim 36;
- c. The specification fails to recite the tar-like coating of claim 44;
- d. The specification fails to recite the rubber coating of claim 45;
- e. The specification fails to recite felt bodies of claim 46;
- f. The specification does not clearly recite the method of claims 56 or 58.

For example the specification does not recite the following: filling the subcells

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with electrolyte before the subcells are assembled (claim 56) or flushing without hydrogen (claim 58).

Applicant should carefully review all claims for proper antecedent basis in the specification for all claimed subject matter.

7. The substitute specification filed July 9, 2003 has not been entered because it does not conform to 37 CFR 1.125(b) and (c) because:

It raises issues of new matter for the reasons set forth in item 8 of this office action.

8. In response to the amendment, the specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required:

- a. The specification fails to recite the limitations of claim 40 in conjunction with the limitations of claims 34 and 35;
- b. The specification fails to recite the limitations of claim 40 in conjunction with the limitations of claim 36;
- c. The specification fails to recite the limitations of claim 40 in conjunction with the limitations of claim 44;
- d. The specification fails to recite the limitations of claim 40 in conjunction with the limitations of claim 45;
- e. The specification fails to recite the limitations of claim 40 in conjunction with the limitations of claim 46.

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This objection is presented in response to the amendment to the claims. As was set forth in the previous office action, the specification lacks antecedent basis for the limitations of claims 34, 35, 36, 44, 45 and 46. The only disclosed relationships of the respective limitations of claims 34-36 and 44-46 is in the context of the claims and thus limited to the claim linking set forth in the original disclosure. Thus for example, claim 34 was originally presented as being dependent upon claim 30. Thus the limitations of claim 34 are defined only by the limitations of claims 30 and 34 and cannot be linked to any other limitations apart from what is recited in claims 30 and 34. The specification does not provide antecedent basis for the limitations of claim 34 in combination with the particular limitations of claim 40. Simple linking of all dependent claims to claims which have been indicated as allowable subject matter, as appears the case in this particular application, is objected to in the manner presented by Applicant since the specification does not provide antecedent basis for such combinations.

### ***Response to Arguments***

9. Applicant's arguments filed July 9, 2003 have been fully considered but they are not persuasive.

With respect to item 5 above: It would appear though that the manner in which the substitute specification addressed this issue would overcome the objection. However, this objection has not been overcome because the substitute specification has not been entered. The Examiner further points out that the marked up copy of the changes does not show the cancellation of the subject matter at issue.

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With respect to item 6 above: The Examiner has considered Applicant's attempt to overcome the objections set forth in items 6a-6f, however the manner in which this attempt has been presented is not commensurate with the scope in which the particular claims are presented in the original disclosure of the instant application.

For example, claim 34 was dependent upon claim 30. These claims corresponded to claims 1 and 5 of the original claims. *The only manner* in which the limitations of claim 34 is presented in the *original disclosure* is in the combination of teachings of claims 30 and 34. Thus in amending the specification to overcome the claim objection, the amendment must only contain the limitations of claim 30 and 34 when incorporating the limitations of claim 34 in the written disclosure. Furthermore, any amendment which links the limitations of claim 34 to claimed features apart from those only found within claim 30 raises new matter since neither the specification nor the claims, as originally filed, adequately supports such relationships.

This logic applies to all of the antecedent basis issues above and for such reasons, the substitute specification has not been entered.

### ***Claim Rejections - 35 USC § 112***

10. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11. Claims 32-55 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to



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reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim recites "electrolyte in an amount determined by the porosity of the electrodes and separator." The instant application does not clearly recite this relationship and the limitation is regarded as new matter.

12. Claims 34-36 and 44-46 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As was set forth in the previous office action, the specification lacks antecedent basis for the limitations of claims 34, 35, 36, 44, 45 and 46. The only disclosed relationships of the respective limitations of claims 34-36 and 44-46 is in the context of the claims and thus limited to the claim linking set forth in the original disclosure. Thus for example, claim 34 was originally presented as being dependent upon claim 30. The limitations of claim 34 are defined only by the limitations of claims 30 and 34 and cannot be linked to any other limitations apart from what is recited in claims 30 and 34. Doing so is held to raise issues of new matter because the original disclosure never clearly appreciated the combinations of claim 40 with claims 34-36 and 44-45 as now linked in the instant application.

13. Claim 35 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which

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was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 35 recites that the capacitance of the negative electrode is 150-250% of the capacitance of the corresponding positive electrode. This range is not supported in the original disclosure which sets forth only that the capacitance of the negative electrode is "preferably 50-150% of the capacitance of the corresponding positive electrode" as found in corresponding claim 6.

### ***Response to Arguments***

14. Applicant's arguments filed July 9, 2003 have been fully considered but they are not persuasive.

With respect to item 12 above, applicant argues that the support for this limitation is found in claim 1 as originally filed in the instant application. Support for this limitation must be found in the PCT document as well in order for this relationship to have adequate support. It would appear that the limitation at issue does not have support in the original disclosure of the PCT and therefore would not have support in the corresponding National Stage Application. Applicant is invited to show that the PCT document has support for this limitation or else cancel the limitation from the claims.

### ***Claim Rejections - 35 USC § 103***

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claims 40, 33, 39, 42, 43, 46, 47, 50 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either U.S. patent No. 4,324,845 (Stockel) or U.S. patent No. 6,146,786 (Stadnick).

Lim discloses a Ni/metal hydride battery of bipolar stack design (abstract and Figs. 1 and 2) comprising: a plurality of subcells (11, 12, 13 ...) disposed in a gastight casing housing (col. 3, ll. 60-64) and pressed against each other via end plates 36 and 38 (Fig. 1 and col. 4, ll. 37-51), each subcell including: positive electrode 44 and negative electrode 40 (Fig. 2 and col. 4, ll. 65-68), a separator 42 disposed between respective positive and negative electrodes (Fig. 1 and col. 4, ll. 65-68), electrolyte provided to the cell wherein the separator and electrodes are porous and have electrolyte disposed therein and the amount of electrolyte provided is inherently determined by the porosity of the separator and electrodes (col. 5, line 36 through col. 6, line 42), an electrically conductive wall 50 or 52 positioned between adjacent subcells, the walls separating the electrolytes of the two adjacent subcells and electrically connecting the electrodes of the two adjacent cells (Fig. 2 and col. 6, ll. 43-50 and col. 8, ll. 3-18), a common gas space 16 in which the cells are disposed (Fig. 1 and col. 5, ll. 25-28), two pressure plates 36 and 38 functioning as current-discharge poles between which the subcells (11, 12, 13 ...) are disposed, wherein the subcells are permanently pressed against one another via bolt assemblies in an elastic manner (Fig. 1 and col. 4, ll. 37-51 as applied to claim 40). The degree of elasticity of claim 40 is

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unspecified and the materials of the prior art have an inherent degree of elasticity permitting the materials to be pressed together as the bolt assemblies are tightened.

The battery is a Ni/metal hydride battery (abstract, col. 5, ll. 36-40 and col. 6, ll. 1-8 as applied to claim 40).

The positive electrode 44 has an addition 48 which is a porous conductor and therefore increases conductivity (Fig. 2 and col. 5, ll. 1-4 as applied to claim 33).

The negative electrode 40 is porous and thus has a structure which allows gases to pass through it (Fig. 2 and col. 6, ll. 1-8 as applied to claim 39).

At least one sealing ring 54 is disposed between each subcell (11, 12, 13 ...) and the common gas space 16 (Figs. 1 and 2) and the rings prevent passage of electrolyte between adjacent cells but permit gas passage via gas channels 56 (Fig. 2 as applied to claim 42).

The ring includes polytetrafluoroethylene which has pore 56 for gas passage and is therefore porous (Fig. 2 and col. 8, ll. 3-18 as applied to claim 43).

The subcells have a nickel felt body which acts as a store for excess electrolyte (col. 6, ll. 22-42 as applied to claim 46).

The electrodes 40 and 44, separators 42 and walls 50 are in the form of plates stacked in the common gas space 16 (Figs. 1 and 2) the negative electrode 40 being having the active layer 41 on one side of the electrode 40 (Fig. 2) and the positive electrode 40 has no active material thereon since it is separated from the negative active material layer 41 by separator 42 (as applied to claim 47). Also the parts are

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cylindrical and flat (plates as shown in Fig. 2) and therefore are also discs (col. 5, ll. 29-35).

The two end plates 36 and 38 are fixed via bolts 29 and 31 and the tightening of the bolts exerts a pressing force against the subcells (Fig. 1 and col. 4, ll. 37-51 as applied to claim 50).

Lim discloses a method of producing a battery (abstract and Figs. 1 and 2) comprising: a disposing a plurality of subcells (11, 12, 13 ...) in a gastight casing housing (col. 3, ll. 60-64) and pressing the subcells against each other via end plates 36 and 38 (Fig. 1 and col. 4, ll. 37-51), wherein each subcell has positive electrode 44 and negative electrode 40 (Fig. 2 and col. 4, ll. 65-68) and a separator 42 disposed between respective positive and negative electrodes (Fig. 1 and col. 4, ll. 65-68), impregnating the separator with a predetermined amount of electrolyte (col. 5, ll. 48-50), disposing an electrically conductive wall 50 or 52 between two adjacent subcells, to separate the electrolytes of the two adjacent subcells and to provide an electrical connection between the electrodes of the two adjacent cells (Fig. 2 and col. 6, ll. 43-50 and col. 8, ll. 3-18), connecting a common gas space 16 to the cells via pore 56 (Fig. 1 and col. 5, ll. 25-28), disposing the subcells between two pressure plates 36 and 38 functioning as current-discharge poles, the electrodes, separators and walls are plate shaped (Fig. 2 and col. 5, ll. 29-35) placing the plates in a stack (Fig. 1) and pressing the plates together via bolts 29 and 31 during assembly (Fig. 1 and col. 4, ll. 37-51 as applied to claim 57).

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The difference between claims 40 and 57 and Lim is that Lim does not disclose a common central gas space.

Stockel discloses of nickel hydrogen cells wherein a central gas space 46 is disposed (Figs. 1-2).

The motivation for employing a central gas space as taught by Stockel is that it provides a means for controlling the temperature of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a central common gas space as taught by Stockel since it would have provided a means for controlling the temperature of the battery.

Stadnick discloses of nickel hydrogen cells wherein a central gas space 46 is disposed (Figs. 1-2, col. 5, ll. 44-65).

The motivation for employing a central gas space as taught by Stadnick is that it provides a means for controlling the temperature of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a central common gas space as taught by Stadnick since it would have provided a means for controlling the temperature of the battery.

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17. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 above and in further view of U.S patent No. 4,844,999 (Oshitani).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

The difference between claim 32 and Lim is that Lim does not specify the positive electrode material to be a fibrous-structure electrode filled with nickel hydroxide active compound.

The positive electrode of Lim is nickel or a hydroxide (col. 5, ll. 36-47) formed on a porous substrate.

Oshitani discloses of positive electrodes including a fibrous structure electrode filled with a nickel hydroxide active compound (abstract). The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

The motivation for using a positive electrode material to be a fibrous-structure electrode filled with nickel hydroxide active compound is that it would have provided a high density cell with long operating life and further improved the ratio of utilization of the active material (abstract)

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by using a positive

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electrode material to be a fibrous-structure electrode filled with nickel hydroxide active compound since it would have provided a high density cell with long operating life and further improved the ratio of utilization of the active material. Furthermore selection of a known material based on its suitability for its intended use supports a prima facie obviousness determination.

18. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 above and in further view of U.S. patent No. 5,032,475 (Hasebe).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

The difference between the instant claims and Lim are that Lim does not disclose of the negative electrode having a higher capacitance than the positive electrode (claim 34) wherein the capacitance of the negative electrode is 150% to 250% of the capacitance of the positive electrode (claim 35).

The hydrogen absorbing alloy negative electrode accommodated in the enclosure and comprised of a conductive core and a layer formed on the conductive core and made of a mixture hydrogen absorbing alloy powder and carbon black having a specific surface area of  $700 \text{ m}^2/\text{g}$  or more, and having a capacity 1.0 to 2.5 times the sum of the capacity of the nickel hydroxide contained in the positive electrode and the electricity required to oxidize the cobalt monoxide powder, a separator made of synthetic resin unwoven fabric having a texture size of 50 to  $100 \text{ g/m}^2$  and a thickness of 0.1 to 0.25 mm, and located between the positive electrode and the negative electrode,



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and alkali electrolyte contained in the enclosure (paragraph bridging columns 2 and 3 of Hasebe).

It is preferred that the negative electrode 2 has a capacity equal to 1.0 to 2.5 times the sum of a nickel hydroxide capacity of the non-sinter type nickel positive electrode 1 and an amount of electricity required for oxidization of the cobalt monoxide. This is because an increase in the inner pressure will hardly be controlled at the early stage of a charge and discharge cycle operation if the capacity of the negative electrode is less than 1.0 time that of the positive electrode. Also, if the capacity of the negative electrode exceeds 2.5 times that of the positive electrode, the accommodating size of the positive electrode in a given volume of the enclosure will be reduced by an increase in the size of the negative electrode. Consequently, the higher energy storage will be no more expected and the use of a large amount of the hydrogen absorbing alloy powder which is costly will raise the production cost (col. 6, ll. 10-26 of Hasebe).

As apparent from Table 2, the nickel-metal hydride secondary cells of Examples 12 to 14 provided with the hydrogen absorbing alloy negative electrodes having a capacity equal to 1.0 to 2.5 times the sum of the nickel hydroxide capacity of the positive electrode and the electricity needed for oxidization of the cobalt monoxide are improved in the operative life, lasting more than 500 cycles. Particularly, the life of the cells of Example 13 and 14 are highly increased ensuring over 800 cycles of charge and discharge operation (col. 16, ll. 40-60).

The motivation for providing a negative electrode having a higher capacitance than the positive electrode (claim 34) wherein the capacitance of the negative electrode

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is 150% to 250% of the capacitance of the positive electrode (claim 35) is that it would have improved the charge and discharge characteristics of the subcells and increased the life of the cells.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a negative electrode having a higher capacitance than the positive electrode (claim 34) wherein the capacitance of the negative electrode is 150% to 250% of the capacitance of the positive electrode (claim 35) since it would have improved the charge and discharge characteristics of the subcells and increased the life of the cells.

19. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 above and in further view of either U.S. patent No. 4,051,305 (Benczur-Urmossy) or U.S. patent No. 5,585,142 (Klein '142).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

The hydrogen storage alloy layer 41 faces the separator 42 (Fig. 2 of Lim as applied to claim 37).

The difference between claim 36 and Lim is that Lim does not explicitly disclose of the negative electrode comprising a plastic bonded hydrogen storage alloy.

The negative electrode of Lim is a three dimensional structure which is porous (col. 6, ll. 1-8 of Lim).

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While plastic bonding is a process, the process employs binding agents and thus further defines the composition of the electrode.

The technique of the synthetic plastic binding or bonding of electrodes has found at first its acceptance in the fuel cell technique because it permits the manufacture of very thin electrodes and because some binding agents frequently possess at the same time desired hydrophobic characteristics. However, also iron- and nickel-oxide electrodes for secondary batteries are known in the art which have been pressed or rolled with the use of organic binding agents. In addition to graphite powder, iron or nickel powder was used as conductive substance, depending on the type of the electrode (col. 2, ll. 8-19 of Benczur-Urmossy).

Klein '142 discloses of a method of fabricating plastic-bonded electrodes using active material having enhanced electronic conductivity. The desired result is an electrode of comparable or improved performance to electrodes which use sintered or foam plaques that are expensive as compared to electrodes manufactured using the subject low-cost plastic bonded process. The desired result is achieved by coating the active material with an ultra-thin conductive skin which enhances the electronic conductivity of the finished electrode (col. 4, ll. 38-48).

The motivation for plastic bonding the electrode is that it permits the manufacture of very thin electrodes having hydrophobic characteristics.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by plastic bonding the

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electrode since it would have permitted the manufacture of very thin electrodes and having hydrophobic characteristics.

20. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 above and in further view of U.S patent No. 4,215,184 (Gutmann).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

The difference between claim 38 and Lim is that Lim does not explicitly disclose of asymmetrical pasting of the active material.

It is known to apply non-symmetrical catalyst coatings to electrodes used in nickel cells (Gutmann col. 5, ll. 30-45)

The motivation for applying an asymmetrical pasting of the active material is to improve the thermal conductivity of the electrode (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by applying an asymmetrical pasting of the active material since it would have improved the thermal conductivity of the electrode.

21. Claims 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 and in further view of U.S patent No. 4,888,256 (Zuckerbrod).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

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The differences between the instant claims and Lim are that Lim does not explicitly disclose of the walls having a tar-like coating material on its edges to prevent the electrolyte from leaking (claim 44) or that each wall has a rubber coating on its edges to prevent the electrolyte from leaking through (claim 45).

The term "tar-like" has been interpreted as any coating which effectively provides the same function as required by the claim. Note that the instant application fails to clearly define what the invention appreciated as "tar-like" materials at the time the claimed invention was made and thus is open to reasonable interpretation.

Lin teaches of the desire to isolate the electrolytic solution of each subcell so as to prevent the formation of parasitic shunt currents (col. 2, ll. 56-64). Thus there is a clear desire to ensure the sealing of these cells.

Zuckerbrod is drawn to intercell separators 12 disposed between adjacent subcells (Fig). The separator 12 employs edge sealing with an adhesive resistant to the electrolyte such as neoprene or an epoxy based adhesive (col. 3, ll. 22-28). The adhesive is held to be "tar-like" since it has adhesive properties and forms an effective edge seal for the intercell separator 12 (as applied to claim 44). Neoprene is an exemplary rubber material (as applied to claim 45)

The motivation for providing a adhesive (i.e. tar-like) neoprene (i.e. rubber) coating on the edges of the walls is to improve the sealing characteristics of the wall between subcells to effectively isolate the electrolytic solutions of each subcell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a adhesive

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(i.e. tar-like) neoprene (i.e. rubber) coating on the edges of the walls since it would have improved the sealing characteristics of the wall between subcells and effectively isolated the electrolytic solutions of each subcell.

22. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 above and in further view of U.S patent No. 5,618,641 (Arias).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

The difference between claim 48 and Lim is that Lim does not explicitly disclose compressing the bipolar array under a pressure from 10 to 35 N/cm<sup>2</sup>.

Arias discloses that it is known to apply compressive pressures to bipolar cell stacks including an upper limit of 20 psi which is about 13.7 N/cm<sup>2</sup> (see col. 3, ll. 5-25). Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesche, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919, F.2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990).

The motivation for applying a compressive pressure is to optimize the battery life and power of the cell.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by applying a compressive pressure of 20 psi is to optimize the battery life and power of the cell.

23. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick as applied to claim 40 above and in further view of U.S patent No. 5,552,243 (Klein '243).

The teachings of claim 40, with respect to Lim and either Stockel or Stadnick, have been discussed above and are incorporated herein.

The difference between claim 49 and Lim is that Lim does not explicitly disclose providing an elastic element as a pressure-exerting component for pressing the subcells together.

Klein '243 discloses that a rubber material 15 can be disposed in the stack to allow for electrode expansion and irregularities in the stack (col. 6, ll. 15-27).

The motivation for providing an elastic element as a pressure-exerting component for pressing the subcells together is that it allows for electrode expansion and irregularities in the stack.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing an elastic element as a pressure-exerting component for pressing the subcells together since it would have allowed for electrode expansion and irregularities in the stack.

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24. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of Stockel as applied to claim 40 above and in further view of Zuckerbrod and U.S. patent No. 4,977,043 (Kadouchi).

The teachings of claim 40 have been discussed above, incorporated herein.

The difference not yet discussed is of the edges or boundary surfaces of the walls having a hydrophobic coating that includes one or more bituminous substances of good adhesion.

Zuckerbrod teaches that the edge portions of the wall separating adjacent cells comprises a hydrophobic adhesive material (col. 3, ll. 3-18 and 22-28). Zuckerbrod does not specify the adhesive material to be a bituminous substance.

Bituminous seals or gaskets are well known in the art of electrochemical cells for the ability to provide excellent seals for the electrochemical cell. In the context of Zuckerbrod, one of ordinary skill in the art would have found it obvious to use a bituminous substance as the sealant since it would have effectively sealed the components as desired by Lin and Zuckerbrod.

Kadouchi discloses that asphalt (a bituminous substance) is employed as a sealing adhesive in an electrochemical cell (col. 7, ll. 27-35).

The motivation for using a bituminous substance as an adhesive sealing material is that it would have provided a means for improved sealing of adjacent cells and prevented electrolyte bridging between the cells. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ



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297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lin by using a bituminous substance as an adhesive sealing material since it would have provided a means for improved sealing of adjacent cells and prevented electrolyte bridging between the cells.

25. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick and U.S. patent No. 5,618,641 (Arias).

Lim discloses a method of producing a battery (abstract and Figs. 1 and 2) comprising: a disposing a plurality of subcells (11, 12, 13 ...) in a gastight casing housing (col. 3, ll. 60-64) and pressing the subcells against each other via end plates 36 and 38 (Fig. 1 and col. 4, ll. 37-51), wherein each subcell has positive electrode 44 and negative electrode 40 (Fig. 2 and col. 4, ll. 65-68) and a separator 42 disposed between respective positive and negative electrodes (Fig. 1 and col. 4, ll. 65-68), impregnating the separator with a predetermined amount of electrolyte (col. 5, ll. 48-50), disposing an electrically conductive wall 50 or 52 between two adjacent subcells, to separate the electrolytes of the two adjacent subcells and to provide an electrical connection between the electrodes of the two adjacent cells (Fig. 2 and col. 6, ll. 43-50 and col. 8, ll. 3-18), connecting a common gas space 16 to the cells via pore 56 (Fig. 1 and col. 5, ll. 25-28), disposing the subcells between two pressure plates 36 and 38 functioning as current-discharge poles, the electrodes, separators and walls are plate shaped (Fig. 2 and col. 5, ll. 29-35) placing the plates in a stack (Fig. 1) and pressing the plates

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together via bolts 29 and 31 during assembly (Fig. 1 and col. 4, ll. 37-51 as applied to claim 56).

The differences between claim 56 and Lim are that Lim does not explicitly disclose filling the subcells with electrolyte before the subcells are assembled or of placing a common gas space in the center of the subcells.

With respect to the electrolyte filling step:

The electrolyte in each subcell is isolated from the other subcells in the stack.

The motivation for filling the subcells with electrolyte before the subcells are assembled.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by filling the subcells with electrolyte before the subcells are assembled.

With respect to the common gas space:

Stockel discloses of nickel hydrogen cells wherein a central gas space 46 is disposed (Figs. 1-2).

The motivation for employing a central gas space as taught by Stockel is that it provides a means for controlling the temperature of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a central

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common gas space as taught by Stockel since it would have provided a means for controlling the temperature of the battery.

Stadnick discloses of nickel hydrogen cells wherein a central gas space 46 is disposed (Figs. 1-2, col. 5, ll. 44-65).

The motivation for employing a central gas space as taught by Stadnick is that it provides a means for controlling the temperature of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a central common gas space as taught by Stadnick since it would have provided a means for controlling the temperature of the battery.

26. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lim in view of either Stockel or Stadnick and U.S patent No. 3,959,018 (Dunlop).

Lim discloses a method of producing a battery (abstract and Figs. 1 and 2) comprising: a disposing a plurality of subcells (11, 12, 13 ...) in a gastight casing housing (col. 3, ll. 60-64) and pressing the subcells against each other via end plates 36 and 38 (Fig. 1 and col. 4, ll. 37-51), wherein each subcell has positive electrode 44 and negative electrode 40 (Fig. 2 and col. 4, ll. 65-68) and a separator 42 disposed between respective positive and negative electrodes (Fig. 1 and col. 4, ll. 65-68), impregnating the separator with a predetermined amount of electrolyte (col. 5, ll. 48-50), disposing an electrically conductive wall 50 or 52 between two adjacent subcells, to separate the electrolytes of the two adjacent subcells and to provide an electrical connection

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between the electrodes of the two adjacent cells (Fig. 2 and col. 6, ll. 43-50 and col. 8, ll. 3-18), connecting a common gas space 16 to the cells via pore 56 (Fig. 1 and col. 5, ll. 25-28), disposing the subcells between two pressure plates 36 and 38 functioning as current-discharge poles, the electrodes, separators and walls are plate shaped (Fig. 2 and col. 5, ll. 29-35) placing the plates in a stack (Fig. 1) and pressing the plates together via bolts 29 and 31 during assembly (Fig. 1 and col. 4, ll. 37-51 as applied to claim 56).

The differences between claim 56 and Lim are that Lim does not explicitly disclose evacuating and filling the battery by flushing with hydrogen without pressure or of placing a common gas space in the center of the subcells.

With respect to the evacuation and filling of the battery:

As discussed above, the phrase without pressure has been interpreted to be atmospheric pressure.

It is known in the art to evacuate a secondary cell and vent the chamber with hydrogen at near atmospheric pressure (1 atm, see column 2, ll. 15-18). Such low-pressure operation

Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesche, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). In the case where the claimed ranges "overlap or lie inside

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ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919, F.2d 1575, 16 USPQ 2d 1934 (Fed. Cir. 1990).

The motivation for evacuating and filling the battery by flushing with hydrogen without pressure.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by evacuating and filling the battery by flushing with hydrogen without pressure

With respect to the common gas space:

Stockel discloses of nickel hydrogen cells wherein a central gas space 46 is disposed (Figs. 1-2).

The motivation for employing a central gas space as taught by Stockel is that it provides a means for controlling the temperature of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a central common gas space as taught by Stockel since it would have provided a means for controlling the temperature of the battery.

Stadnick discloses of nickel hydrogen cells wherein a central gas space 46 is disposed (Figs. 1-2, col. 5, ll. 44-65).

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The motivation for employing a central gas space as taught by Stadnick is that it provides a means for controlling the temperature of the battery.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Lim by providing a central common gas space as taught by Stadnick since it would have provided a means for controlling the temperature of the battery.

### ***Response to Arguments***

27. Applicant's arguments with respect to the instant claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Allowable Subject Matter***

28. No prior art of record has been applied to claims 52-54. Therein claim 52 recites that the subcells have a central passage wherein the subcells are connected to the central passage by porous connecting elements.

Upon further consideration, the central passage as defined by the claims can encompass a heating or cooling channel. Such reasoning is applied in the prior art rejections above.

The central passages of either Stockel or Stadnick are heating/cooling channels wherein a coolant gas or liquid is supplied. One of ordinary skill in the art would not have found it obvious to modify the central coolant channel to be connected to the central passage by porous connecting elements since the porous elements would have

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caused the gas/fluid in the heating/coolant channel to diffuse into the electrochemical components of the subcells. The coolant materials of the prior art such as ammonia or Freon would materially alter the electrochemical operation of the subcells. Therefore in keeping with the consistency of the prior art of record, the connections between the heating/coolant and subcells must not be porous so that the requisite temperature regulation is achieved and the gases and fluids within the heating/cooling channel is isolated from the subcells (thus not connected by porous elements).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo  
Patent Examiner  
Art Unit 1745

gc



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